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NASA/SP—1999-7011/SUPPL485
February 22, 1999

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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51 Life Sciences (General) 1

52 Aerospace Medicine 3

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 Behavioral Sciences 6

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54 Man/System Technology and Life Support 6

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Typical Report Citation and Abstract

❶ 19970001126 NASA Langley Research Center, Hampton, VA USA
❷ Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA.
❹ Mar. 1996, 130p, In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10° to 50°, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics, however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65° swept forebody serrations tended to roll together, while vortices from 40° swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

1. Document ID Number, Corporate Source
2. Title
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9. Subject Terms

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 485)

FEBRUARY 22, 1999

51
LIFE SCIENCES (GENERAL)

19990014242 NASA Kennedy Space Center, Cocoa Beach, FL USA

Influences of Changes in Daylength and Carbon Dioxide on the Growth of Potato

Wheeler, Raymond, NASA Kennedy Space Center, USA; Tibbitts, Theodore W., Wisconsin Univ., USA; Annals of Botany; 1997; ISSN 0305-7364; Volume 79, pp. 529-533; In English; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Potatoes (Solanum tuberosum L.) are highly productive in mid- to high-latitude areas where photoperiods change significantly throughout the growing season; to study the effects of changes in photoperiod on growth and tuber development of potato cv. Denali, plants were grown for 112 d with 400 micromol/sq m/s photosynthetic photon flux (PPF) under a 12-h photoperiod (short days, SDs), a 24-h photoperiod (long days, LDs), and combinations where plants were moved between the two photoperiods 28, 56, or 84 d after planting. Plants given LD throughout growth received the greatest total daily PPF and produced the greatest tuber yields. At similar levels of total PPF, plants given SD followed by LD yielded greater tuber dry mass (DM) than plants given LD followed by SD. Stem DM per plant, leaf DM, and total plant DM all increased with an increasing proportion of LD and increasing daily PPF, regardless of the daylength sequence. When studies were repeated, but at an enriched (1000micromol/mol) CO2 concentration, overall growth trends were similar, with high CO2 resulting in greater stem length, stem DM, leaf DM, and total plant DM, but high CO2 did not increase tuber DM.

Author

Potatoes; Carbon Dioxide Concentration; Photosynthesis; Planting; Carbon Dioxide

19990014243 Dynamac Corp., Cocoa Beach, FL USA

Evaluation of an Anaerobic Digestion System for Processing CELSS Crop Residues for Resource Recovery

Strayer, R. F., Dynamac Corp., USA; Finger, B. W., Dynamac Corp., USA; Alazraki, M. P., Dynamac Corp., USA; Advances in Space Research; 1997; ISSN 0273-1177; Volume 20, No. 10, pp. 2009-2015; In English; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Three bioreactors, connected in series, were used to process CELSS potato residues for recovery of resources. The first stage was an anaerobic digestor (8 L working volume; cow rumen contents inoculum; fed-batch; 8 day retention time; feed rate 25 gds/day) that converted 33% of feed (dry weight loss) to CO2 and "volatile fatty acids" (vfa; 83:8:8 mmolar ratio acetic:propionic:butyric). High nitrate-N in the potato residue feed was absent in the anaerobic effluent, with a high portion converted to NH4(+)-N and the remainder unaccounted and probably lost to denitrification and NH4(+) volatilization. Liquid anaerobic effluent was fed to an aerobic, yeast biomass production vessel (2 L volume; Candida ingens inoculum; batch [pellicle] growth; 2 day retention time) where the VFAs and some NH4(+)-N were converted into yeast biomass. Yeast yields accounted for up to 8% of potato residue fed into the anaerobic bioreactor. The third bioreactor (0.5 L liquid working volume; commercial nitrifier inoculum; packed-bed biofilm; continuous yeast effluent feed; recirculating; constant volume; 2 day hydraulic retention time) was used to convert successfully the remaining NH4(+)-N into nitrate-N (preferred form of N for CELSS crop production) and to remove the remaining degradable soluble organic carbon. Effluents from the last two stages were used for partial replenishment of minerals for hydroponic potato production.

Author

Crop Growth; Bioreactors; Potatoes; Replenishment; Nitrates; Bioconversion; Closed Ecological Systems; Denitrogenation

19990014244 Dynamac Corp., Cocoa Beach, FL USA

Effects of Bioreactor Retention Time on Aerobic Microbial Decomposition of CELSS Crop Residues

Strayer, R. F., Dynamac Corp., USA; Finger, B. W., Dynamac Corp., USA; Alazraki, M. P., Dynamac Corp., USA; Advances in

Space Research, 1997, ISSN 0273-1177, Volume 20, No. 10, pp. 2023-2028. In English. Copyright. Avail: Issuing Activity, Hardcopy, Microfiche

The focus of resource recovery research at the KSC CELSS Breadboard Project has been the evaluation of microbiologically mediated biodegradation of crop residues by manipulation of bioreactor process and environmental variables. We will present results from over 3 years of studies that used laboratory- and breadboard-scale (8 and 120 L working volumes, respectively) aerobic, fed-batch, continuous stirred tank reactors (CSTR) for recovery of carbon and minerals from breadboard grown wheat and white potato residues. The paper will focus on the effects of a key process variable, bioreactor retention time, on response variables indicative of bioreactor performance. The goal is to determine the shortest retention time that is feasible for processing CELSS crop residues, thereby reducing bioreactor volume and weight requirements. Pushing the lower limits of bioreactor retention times will provide useful data for engineers who need to compare biological and physicochemical components. Bioreactor retention times were manipulated to range between 0.25 and 48 days. Results indicate that increases in retention time lead to a 4-fold increase in crop residue biodegradation, as measured by both dry weight losses and CO2 production. A similar overall trend was also observed for crop residue fiber (cellulose and hemicellulose), with a noticeable jump in cellulose degradation between the 5.3 day and 10.7 day retention times. Water-soluble organic compounds (measured as soluble TOC) were appreciably reduced by more than 4-fold at all retention times tested. Results from a study of even shorter retention times (down to 0.25 days), in progress, will also be presented.

Author

Bioreactors, Biodegradation, Microorganisms, Decomposition, Closed Ecological Systems, Wheat, Residues

19980014245 NASA Kennedy Space Center, Cocoa Beach, FL USA

Effect of Elevated Carbon Dioxide on Nutritional Quality of Tomato

Wheeler, R. M., NASA Kennedy Space Center, USA; Mackowiak, C. L., Dynamac Corp., USA; Stutte, G. W., Dynamac Corp., USA; Yorio, N. C., Dynamac Corp., USA; Berry, W. L., California Univ., USA; Advances in Space Research, 1997, ISSN 0273-1177, Volume 20, No. 10, pp. 1975-1978. In English. Copyright. Avail: Issuing Activity, Hardcopy, Microfiche

Tomato (Lycopersicon esculentum Mill. cvs. Red Robin (RR) and Reimann Philipp (RP)) were grown hydroponically for 105 d with a 12 h photoperiod, 26 C/22 C thermoperiod, and 800 micromol/ sq m/s PPF at either 400, 1200, 5000, or 10,000 micromol/mol (0.04, 0.12, 0.50, 1.00 kPa) CO2. Harvested fruits were analyzed for proximate composition, total dietary fiber, nitrate, and elemental composition. No trends were apparent with regard to CO2 effects on proximate composition, with fruit from all treatments and both cultivars averaging 18.9 % protein, 3.6 % fat, 10.2 % ash, and 67.2 % carbohydrate. In comparison, average values for field-grown fruit are 16.6 % protein, 3.8 % fat, 8.1 % ash, and 71.5 % carbohydrate (Duke and ATChely, 1986). Total dietary fiber was highest at 10,000 micromol/mol (28.4 % and 22.6 % for RR and RP) and lowest at 1000 micromol/mol (18.2 % and 15.9 % for RR and RP), but showed no overall trend in response to CO2. Nitrate values ranged from 0.19 % to 0.35 % and showed no trend with regard to CO2. K, Mg, and P concentrations showed no trend in response to CO2, but Ca levels increased from 198 and 956 ppm in RR and RP at 400 micromol/mol, to 2537 and 2825 ppm at 10,000 micromol/mol. This increase in Ca caused an increase in fruit Ca/P ratios from 0.07 and 0.37 for RR and RP at 400 micromol/molto 0.99 and 1.23 for RR and RP at 10,000 micromol/mol suggesting that more dietary Ca should be available from high CO2-grown fruit.

Author

Tomatoes, Carbon Dioxide, Chemical Composition, Hydroponics, Nitrates, Nutrition

19980014246 NASA Kennedy Space Center, Cocoa Beach, FL USA

Ethylene Production by Plants in a Closed Environment

Wheeler, R. M., NASA Kennedy Space Center, USA; Peterson, B. V., NASA Kennedy Space Center, USA; Sager, J. C., NASA Kennedy Space Center, USA; Knott, W. M., NASA Kennedy Space Center, USA; Advances in Space Research, 1996, ISSN 0273-1177, Volume 18, No. 4/5, pp. (4/5)193-(4/5)196. In English. Copyright. Avail: Issuing Activity, Hardcopy, Microfiche

Ethylene production by 20-sq m stands of wheat, soybean, lettuce and potato was monitored throughout growth and development in NASA's Controlled Ecological Life Support System (CELSS) Biomass Production Chamber. Chamber ethylene concentrations rose during periods of rapid growth for all four species, reaching 120 parts per billion (ppb) for wheat, 60 ppb for soybean, and 40 to 80 ppb for lettuce and potato. Following this, ethylene concentrations declined during seed fill and maturation (wheat and soybean), or remained relatively constant (potato). Lettuce plants were harvested during rapid growth and peak ethylene production. The highest ethylene production rates (unadjusted for chamber leakage) ranged from 0.04 to 0.06 ml/sq m/day during rapid growth of lettuce and wheat stands, or approximately 0.8 to 1.1 ml/g fresh weight/h. Results suggest that ethylene

production by plants is a normal event coupled to periods of rapid metabolic activity, and that ethylene removal or control measures should be considered for growing crops in a tightly closed CELSS.
Author
Closed Ecological Systems; Ethylene; Ecosystems; Soybeans; Biomass; Life Support Systems

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19990014351 Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Neuilly-Sur-Seine, France
Laser Generated 3-D Space Display Images
Edwards, L., Advisory Group for Aerospace Research and Development, France; Aerospace 2020; Sep. 1997; Volume 3, pp. 7-10; In English; Also announced as 19990014353; Copyright Waived; Avail: CASI; A01, Hardcopy; A02, Microfiche

Conventional techniques of forming three dimensional (3-D) images on a two dimensional screen involve the use of electronic or optical tricks, such as the use of special eyewear. In a 3-D space display, however, the images are formed directly from luminous points distributed in all three spatial dimensions. Instead of pixels, one has voxels (volume-pixels). There are a number of approaches currently under development for 3-D space displays, some holographic and others mechanical, but the goal is to achieve a 3-D space display with no moving parts and a full 360 degree view requiring no special eyewear. This goal is within reach through the use of new two-photon laser photoexcitation techniques where two laser beams of different wavelengths intersect in a special transparent media. Fluorescence is emitted at the intersection where the combinations of the excitations creates the emissions. By multiplexing the laser beams throughout the media, a solid display object can thus be synthesized. This presentation will review the state-of-the-art of 3-D space display technology and develop a prospectus for future applications in air traffic control and mission management.
Author
Display Devices; Visual Aids; Virtual Reality

19990014457 NASA Langley Research Center, Hampton, VA USA
Aerospace Medicine and Biology: A Continuing Bibliography, Supplement 483
Jan. 25, 1999; 21p; In English
Report No.(s): NASA/SP-1999-7011/SUPPL483; NAS 1.21:7011/SUPPL483; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Aerospace Medicine and Biology concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety, and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.
Derived from text
Aerospace Medicine; Biology; Toxicology; Psychological Effects; Pharmacology; Life Support Systems; Interplanetary Space; Exobiology; Environment Effects; Earth Atmosphere

19990014461 Iowa Univ., Dept. of Psychology, Iowa City, IA USA
Central Renin Injections: Effects on Drinking and Expression of Immediate Early Genes
Xu, Zhice, Iowa Univ., USA; Johnson, Alan Kim, Iowa Univ., USA; Brain Research; 1998; ISSN 0006-8993; Volume 782, pp. 24-35; In English
Contract(s)/Grant(s): N00014-97-1-0145; NAG5-6171; NIH-HL-14388; NIH-HL-57472; No Copyright; Avail: Issuing Activity; Hardcopy; Microfiche

This study investigated the drinking response and the expression of Fos- and Egr-1-immunoreactivity (Fos-ir, Egr-1-ir) in the brain induced by endogenous angiotensin generated by intracerebroventricular (i.c.v.) injection of renin. Renin induced Fos-ir in the subfornical organ (SFO), median preoptic (MnPO), supraoptic and paraventricular nuclei (SON and PVN), area postrema (AP), nuclei of the solitary tract (NTS) and lateral parabrachial nuclei (LPBN). Renin-induced Egr-1-ir exhibited a similar pattern of distribution as that observed for Fos-ir. The dose of i.c.v. renin that induced expression of immediate early gene (IEG) product immunoreactivity also produced vigorous drinking. When renin-injected rats were pretreated with captopril, an angiotensin con-

verting enzyme inhibitor, drinking was blocked. With the same captopril pretreatment, both Fos- and Lyr-1-ir in the SFO, MnPO, SON, PVN, AP and LPBN were also significantly reduced.
Author
Brain; Enzymes; Drinking; Genes

19990014462 Paulista State Univ., Dept. of Physiology, Araraquara Brazil
Lateral Parabrachial Nucleus Serotonergic Mechanisms and Salt Appetite Induced by Sodium Depletion
Menani, Jose Vanderlei, Paulista State Univ., Brazil; DeLuca, Laurival Antonio, Jr., Paulista State Univ., Brazil; Johnson, Alan Kim, Iowa Univ., USA; American Journal of Physiology; 1998; ISSN 0363-6119; pp. R555-R559; In English
Contracts/Grants(s): N00014-97-1-0145; NAG5-6171; CNPq-930167-7; CAPES-AEX-1400/94-0; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

This study investigated the effects of bilateral injections of a serotonin (5-HT) receptor agonist into the lateral parabrachial nucleus on the intake of NaCl and water induced by 24-h water deprivation or by sodium depletion followed by 24 h of sodium deprivation (injection of the diuretic furosemide plus 24 h of a sodium-deficient diet). Rats had stainless steel cannulas implanted bilaterally into the LPBN. Bilateral LPBN injections of the serotonergic 5-HT(1/2) receptor antagonist methysergide (4 micro-g/200 nl at each site) increased hypertonic NaCl intake when tested 24 h after sodium depletion and after 24 h of water deprivation. Water intake also increased after bilateral injections of methysergide into the LPBN. In contrast, the intake of a palatable solution (0.06 M sucrose) under body fluid-replete conditions was not changed after bilateral LPBN methysergide injections. The results show that serotonergic mechanisms in the LPBN modulate water and sodium intake induced by volume depletion and sodium loss. The finding that sucrose intake was not affected by LPBN serotonergic blockade suggests that the effects of the methysergide treatment on the intakes of water and NaCl are not due to a mechanism producing a nonspecific enhancement of all ingestive behaviors.
Author
Serotonin; Sodium; Diuretics; Water Deprivation; Sucrose; Body Fluids; Sodium Chlorides

19990014463 Iowa Univ., Dept. of Psychology, Iowa City, IA USA
Central Methysergide Prevents Renal Sympathoinhibition and Bradycardia during Hypotensive Hemorrhage
Veelken, Roland, Erlangen-Nuernberg Univ., Germany; Johnson, Kim, Iowa Univ., USA; Scrogin, Karie E., Iowa Univ., USA; American Journal of Physiology; 1998; ISSN 0363-6135; pp. H43-H51; In English
Contracts/Grants(s): N00014-97-1-0145; NAG5-6171; NAGw-4358; NIH-HL-14388; NIH-HL-57472; NIH-HL-07121; NIH-HL-09545; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Central methysergide prevents renal sympathoinhibition and bradycardia during hypotensive hemorrhage. Mean arterial pressure (MAP), heart rate (HR), and renal sympathetic nerve activity (RSNA) were measured in conscious rats during either hemorrhage or cardiopulmonary receptor stimulation with phenylbiguanide (PBG) after intracerebroventricular injection of the 5-HT1/5-HT2-receptor antagonist, methysergide (40 microg). Progressive hemorrhage caused an initial rise (109 +/- 3%) followed by a fall in RSNA (-60 +/- 7%) and a fall in HR (-126 +/- 7 beats/min). Methysergide delayed the hypotension and prevented both the sympathoinhibitory and bradycardic responses to hemorrhage. Systemic 5-HT3-receptor blockade did not influence responses to hemorrhage. The PBG infusion caused transient depressor (-25 +/- 6 mmHg), bradycardic (-176 +/- 40 beats/min), and renal sympathostimulatory (182 +/-47% baseline) responses that were not affected by central methysergide (-20 +/- 6 mmHg, -162 +/- 18 beats/min, 227 +/- 46% baseline). These data indicate that a central serotonergic receptor-mediated component contributes to the sympathoinhibitory and bradycardic responses to hypotensive hemorrhage in conscious rats. Furthermore, the same central 5-HT-receptor populations involved in reflex responses to hypotensive hemorrhage probably do not mediate the sympathoinhibitory response to cardiopulmonary chemosensitive 5-HT3 receptors.
Author
Hemorrhages; Bradycardia; Heart Rate; Hypotension; Heart Function

19990017762 Army Aeromedical Research Lab., Fort Rucker, AL USA
The Efficacy of Dexedrine for the Sustainment of Helicopter Pilot Performance During 64 Hours of Continuous Wakefulness. *Final Rep.*
Caldwell, J. A.; Smythe, N. K.; DeRoc, P. A.; Prazinko, B. F.; Caldwell, J. L.; Oct. 1998; 68p; In English
Contracts/Grants(s): Proj-3M162787A879
Report No.(s): AD-A356684; USAARL-TR-99-01; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The purpose of this investigation was to establish the efficacy of Dexedrine for sustaining aviator performance despite 64 hours of extended wakefulness. Although earlier flight studies yielded favorable results with no significant side effects, they

were restricted to sleep-deprivation periods of only 40 hours. Due to requirements for longer periods of sustained wakefulness, it was necessary to study the efficacy of Dexedrine for maintaining aviator performance during 3 days and 2 nights without sleep. to accomplish this, computerized evaluations of aviator flight skills were conducted at regular intervals as subjects completed standardized flights in a UH-60 helicopter simulator, both under Dexedrine and placebo. Laboratory-based assessments of cognitive, psychological, and central nervous system status were completed as well. Dexedrine (10 mg) was given prophylactically (prior to signs of fatigue) at midnight, 0400, and 0800 on both deprivation days in one cycle, and placebo was given on both days in the other. Results indicated simulator flight performance was maintained by Dexedrine for up to 58 hours, while performance under placebo rapidly deteriorated. The drug was most beneficial
DTIC
Drugs; Amphetamines; Effectiveness; Helicopter Performance; Research; Aircraft Pilots; Human Performance

19990017765 Army Aeromedical Research Lab., Fort Rucker, AL USA
Recovery of Sleep, Performance, and Mood Following 38 Hours of Sleep Deprivation Using Naps as a Countermeasure
Final Report
Caldwell, J. L.; Caldwell, John A., Jr.; Colon, Jose; Ruyak, Peggy S.; Ramspott, Stephanie; Sep. 1998; 32p; In English
Contract(s)/Grant(s): Proj-3M162787A879
Report No.(s): AD-A356097; USAARL-98-37; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In certain situations, soldiers must continue to perform their duties over an extended period of time, knowing that their regular sleep period will be missed and their time awake will extend well past 24 hours. Although equipment may be able to operate over extended work hours, personnel are not capable of continuing for days without proper rest and recovery. However, during the times when extended work hours are required, soldiers must find a way to maintain alertness in order to carry out their duties. When one chooses a countermeasure to aid soldiers' performance, the decision is based on how well the method will increase alertness and performance. However, one must also examine how a person will recover from the countermeasure, how long it will take before he/she is ready to continue the work schedule, and what consequences will occur due to the countermeasure. Many studies are aimed at how well countermeasures work in the short run, but neglect to examine the aftereffects.
DTIC
Sleep Deprivation; Rest; Sleep; Stress (Psychology); Stress Relieving; Human Performance; Military Technology

19990017776 NASA Johnson Space Center, Houston, TX USA
Changes in Compensatory Eye Movements Associated with Simulated Stimulus Conditions of Spaceflight
Harm, Deborah L., NASA Johnson Space Center, USA; Zografos, Linda M., NASA Johnson Space Center, USA; Skinner, Noel C., NASA Johnson Space Center, USA; Parker, Donald E., Miami Univ., USA; Aviation, Space, and Environmental Medicine; September 1993, pp. 820-826; In English
Contract(s)/Grant(s): NAS9-17720; NAS9-17413; NAG9-703
Report No.(s): NASA/CR-93-207266; NAS 1.26:207266; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

Compensatory vertical eye movement gain (CVEMG) was recorded during pitch oscillation in darkness before, during and immediately after exposures to the stimulus rearrangement produced by the Preflight Adaptation Trainer (PAT) Tilt-Translation Device (TTD). The TTD is designed to elicit adaptive responses that are similar to those observed in microgravity-adapted astronauts. The data from Experiment 1 yielded a statistically significant CVEMG decrease following 15 minutes of exposure to a stimulus rearrangement condition where the phase angle between subject pitch tilt and visual scene translation was 270 degrees; statistically significant gain decreases were not observed following exposures either to a condition where the phase angle between subject pitch and scene translation was 90 degrees or to a no-stimulus-rearrangement condition. Experiment 2 replicated the 270 degree phase condition from Experiment 1 and extended the exposure duration from 30 to 45 minutes. Statistically significant additional changes in CVEMG associated with the increased exposure duration were not observed. The adaptation time constant estimated from the combined data from Experiments 1 and 2 was 29 minutes.
Author
Eye Movements; Microgravity; Astronaut Training; Physiological Effects; Aerospace Medicine; Otolith Organs; Biostronautics; Weightlessness

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19990014354 Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Neuilly-Sur-Seine, France
Drawing on Today's Wise Investments: Longitudinal and Baseline Human-Resource Research
King, R. E., Advisory Group for Aerospace Research and Development, France; McGlohn, S. E., Advisory Group for Aerospace Research and Development, France; Retzlaff, P. D., Advisory Group for Aerospace Research and Development, France; Aerospace 2020; Sep. 1997; Volume 3, pp. 3-6; In English; Also announced as 19990014353; Copyright Waived; Avail: CASI; A01, Hardcopy; A02, Microfiche

Many of the pilots who will be flying in the year 2020 are just now being born or are currently very young children. We will know more about these pilots than we presently know about our current pilots. The air forces of the future will surely include many more women as they will likely compete on an equal footing and may be represented in all cockpits. Efforts currently underway, including Neuropsychiatrically Enhanced Flight Screening, Assessment of Psychological Factors in Aviators and Psychological Factors of Aviators' Success may bear fruit and answer the question of whether female pilots self-select into aviation or if they are shaped as a result of the process of pilot training. The year 2020 may see the Armstrong Laboratory Aviator Personality Survey as a well established test for use with aviators, with international norms. As we invest increasingly large amounts of money into each individual airframe and mission, we must learn more about the human operator, whether that individual is a pilot or a controller of a pilotless aircraft or spacecraft (Uninhabited Aerial Vehicle).
Author
Human Resources; Aircraft Pilots; Personnel Development; Human Performance

54
MAN SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19990014371 Advisory Group for Aerospace Research and Development, Mission Systems Panel, Neuilly-Sur-Seine, France
Integration of Technologies for Closed Cockpits
Timmers, H., Advisory Group for Aerospace Research and Development, France; Helps, K., Advisory Group for Aerospace Research and Development, France; Aerospace 2020; Sep. 1997; Volume 3, pp. 78; In English; Also announced as 19990014353; Copyright Waived; Avail: CASI; A01, Hardcopy; A02, Microfiche; Abstract Only; Abstract Only

All future aerial missions are threatened by directed energy weapons (DEWS) or flash devices. The availability of rather inexpensive blinding flash devices can soon significantly hinder or even prevent the effective use of air power. In order to protect aircrews and enable them to successfully continue the mission the concept of closed cockpits will be an important means to overcome these threats. Processing capabilities which will be available in the near to midterm future make the realization of closed cockpits feasible. Still, the closed cockpit impose some severe problems which must be solved in order to maintain crew awareness under all circumstances and in all phases of flight. To name only a few of them, problems associated with synthetic vision, sensor displays and sensor integration or pilot interaction with all aircraft systems must be solved to make the closed cockpit concept operational viable. It must be proven, that sensors can be built, which work reliably under all conditions (including massive counter measures), that all available data can be fused together and that all these sensors can be integrated in a way to give results which can be trusted and effectively communicated to the aircrew. The realization of closed cockpits is a task, which requires contributions from many other technology fields, hence, it works as a technology driver also outside it direct field of application. The benefits of the closed cockpit will be the ability to perform aerial missions also in presence of a new class of threats successfully.
Author
Cockpits; Pilot Support Systems; Multisensor Fusion; Systems Integration; Flight Management Systems

Subject Term Index

A

AEROSPACE MEDICINE, 4, 5
AIRCRAFT PILOTS, 5, 6
AMPHETAMINES, 5
ASTRONAUT TRAINING, 5

B

BIOASTRONAUTICS, 5
BIOCONVERSION, 1
BIODEGRADATION, 2
BIOLOGY, 3
BIOMASS, 3
BIOREACTORS, 1, 2
BODY FLUIDS, 4
BRADYCARDIA, 4
BRAIN, 4

C

CARBON DIOXIDE, 1, 2
CARBON DIOXIDE CONCENTRATION, 1
CHEMICAL COMPOSITION, 2
CLOSED ECOLOGICAL SYSTEMS, 1, 2, 3
COCKPITS, 6
CROP GROWTH, 1

D

DECOMPOSITION, 2
DENITROGENATION, 1
DISPLAY DEVICES, 3
DIURETICS, 4
DRINKING, 4
DRUGS, 5

E

EARTH ATMOSPHERE, 3
ECOSYSTEMS, 1
EFFECTIVENESS, 5
ENVIRONMENT EFFECTS, 3
ENZYMES, 1
ETHYLENE, 3
EXOBIOLOGY, 3
EYE MOVEMENTS, 5

F

FLIGHT MANAGEMENT SYSTEMS, 6

G

GENES, 1

H

HEART FUNCTION, 4
HEART RATE, 4
HELICOPTER PERFORMANCE, 5
HEMORRHAGES, 4
HUMAN PERFORMANCE, 5, 6
HUMAN RESOURCES, 6
HYDROPONICS, 2
HYPOTENSION, 4

I

INTERPLANETARY SPACE, 3

L

LIFE SUPPORT SYSTEMS, 3

M

MICROGRAVITY, 5
MICROORGANISMS, 2
MILITARY TECHNOLOGY, 5
MULTISENSOR FUSION, 6

N

NITRATES, 1, 2
NUTRITION, 2

O

OTOLITH ORGANS, 5

P

PERSONNEL DEVELOPMENT, 6
PHARMACOLOGY, 4
PHOTOSYNTHESIS, 1
PHYSIOLOGICAL EFFECTS, 5
PILOT SUPPORT SYSTEMS, 6
PLANTING, 1
POTATOES, 1
PSYCHOLOGICAL EFFECTS, 3

R

REPLENISHMENT, 1
RESEARCH, 5
RESIDUES, 2
REST, 5

S

SEROTONIN, 4
SLEEP, 5
SLEEP DEPRIVATION, 5
SODIUM, 4
SODIUM CHLORIDES, 4
SOYBEANS, 3
STRESS (PSYCHOLOGY), 5
STRESS (BELIEVING), 5
SUCROSE, 4
SYSTEMS INTEGRATION, 6

T

TOMATOES, 2
TOXICOLOGY, 4

V

VIRTUAL REALITY, 3
VISUAL AIDS, 3

W

WATER DEPRIVATION, 4
WEIGHTLESSNESS, 5
WHEAT, 2

Personal Author Index

A

Alazraki, M. P., 1

B

Berry, W. L., 2

C

Caldwell, J. A., 4
Caldwell, J. L., 4, 5
Caldwell, John A., Jr., 5
Colon, Jose, 5

D

DeDio, P. A., 4
DeLuca, Lamival Antonio, Jr., 4

F

Finger, B. W., 1

H

Hamm, Deborah L., 5
Helps, K., 6

J

Johnson, Alan Kim, 3, 4
Johnson, Kim, 4

K

King, R. E., 6
Knott, W. M., 2

M

Mackowiak, C. L., 2
McGlohn, S. E., 6
Menami, Jose Vanderlei, 4

P

Parker, Donald E., 5
Peterson, B. V., 2
Pyzynski, B. F., 4

R

Ramspott, Stephanie, 5
Retzlaff, P. D., 6
Royal, Peggy S., 5

S

Soper, J. C., 2
Scroggin, Karie E., 4
Skinner, Noel C., 5
Smythe, N. K., 4
Strayer, R. F., 1
Smale, G. W., 2

T

Taboada, J., 3
Tibbitts, Theodore W., 1
Timmers, H., 6

V

VanEven, Roland, 4

W

Wheeler, R. M., 2
Wheeler, Raymond, 1

X

Xu, Zhuge, 3

Y

Yates, N. C., 2

Z

Zografos, Linda M., 5

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